ABSTRACT OF THE DISCLOSURE

A combined PET and X-Ray CT tomograph for acquiring CT and PET images sequentially in a single device, overcoming alignment problems due to internal organ movement, variations in scanner bed profile, and positioning of the patient for the scan. In order to achieve good signal-to-noise (SNR) for imaging any region of the body, an improvement to both the CT-based attenuation correction procedure and the uniformity of the noise structure in the PET emission scan is provided. The PET/CT scanner includes an X-ray CT and two arrays of PET detectors mounted on a single support within the same gantry, and rotate the support to acquire a full projection data set for both imaging modalities. The tomograph acquires functional and anatomical images which are accurately co-registered, without the use of external markers or internal landmarks.